LISA as a Xylophone Interferometer Detector of Gravitational Radiation

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ABSTRACT

Searches for gravitational radiation can be performed in space with two spacecraft tracking each other's with coherent laser light. One-way coherent laser tracking data recorded on board the two spacecraft are time tagged and telemetered back to Earth for data analysis. By linearly combining the two data sets, we derive a method for reducing by several orders of magnitude, at selected Fourier components, the frequency fluctuations due to the lasers. The gravitational wave signal remaining at these frequencies makes spacecraft to spacecraft tracking the equivalent of a *xylophone interferometer detector* of gravitational radiation.

Strain sensitivities, achievable by implementing this experimental technique with the LISA mission, are estimated for gravitational wave bursts, monochromatic signals, and a stochastic background of gravitational radiation.